CHAPTER 13. UTILITY IMPACT ANALYSIS

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13.1 INTRODUCTION

The Department will analyze the effects of proposed commercial unitary air conditioner standard levels on the electric utility industry as part of the Notice of Proposed Rulemaking (NOPR) analysis, using a variant of the U.S. DOE/Energy Information Administration (EIA)'s National Energy Modelling System (NEMS).[a] The NEMS is a large, multi-sectoral, partial equilibrium model of the U.S. energy sector. The DOE/EIA uses NEMS to produce the *2003 Annual Energy Outlook (AEO2003).*[1] NEMS produces a widely recognized baseline energy forecast for the U.S. through 2025, and is available in the public domain. The Department will use a variant known as NEMS-BT to provide key inputs to the analysis. The utility impact analysis will consist of a comparison between model results for the base case and for policy cases in which proposed standards are in place.

The use of NEMS-BT for the utility analysis offers several advantages. As the official DOE energy forecasting model, NEMS relies on a set of assumptions that are transparent and have received wide exposure and commentary. NEMS-BT allows an estimate of the interactions between the various energy supply and demand sectors and the economy as a whole. The utility analysis will report the changes in installed capacity and generation, by fuel type, that result for each trial standard level, as well as changes in electricity sales to the commercial sector.

The Department conducts the utility analysis as a policy deviation from the *AEO2003*, applying the same basic set of assumptions. For example, the operating characteristics (e.g., energy conversion efficiency, emissions rates) of future electricity generating plants are as specified in the *AEO2003* reference case, as are the prospects for natural gas supply.

The Department also will explore deviations from some of the reference case assumptions, to represent alternative futures. Two alternative scenarios use the high and low economic growth cases of *AEO2003.* (The reference case corresponds to medium growth.) The high economic growth case assumes higher projected growth rates for population, labor force, and labor productivity, resulting in lower predicted inflation and interest rates relative to the reference case and higher overall aggregate economic growth. The opposite is true for the low growth case. The high growth case predicts growth in per capita gross domestic product (GDP) of 2.5 percent per year, compared with 2.2 percent per year in the reference case, and 1.9 percent per year in the low growth case. The model predicts that economic output grows at 3.5 percent per year in the high growth case, 3.0 percent per year in the reference case, and 2.5 percent per

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[a] For more information on NEMS, please refer to the U.S. Department of Energy, Energy Information Administration documentation. A useful summary is *National Energy Modeling System: An Overview 2000*, DOE/EIA-0581(2000), March, 2000. DOE/EIA approves use of the name NEMS to describe only an official version of the model without any modification to code or data. Because this analysis entails some minor code modifications and the model is run under various policy scenarios that are variations on DOE/EIA assumptions, the Department refers to it by the name NEMS-BT (BT is DOE's Building Technologies Program, under whose aegis this work has been performed). NEMS-BT was previously called NEMS-BRS.

year in the low growth case. While supply-side growth determinants are varied in these cases, *AEO2003* assumes the same reference case energy prices for all three economic growth cases. Different economic growth scenarios will affect the rate of growth of electricity demand.

13.2 METHODOLOGY

The electric utility industry analysis will consist of NEMS-BT forecasts for generation, installed capacity, sales, and prices.

The NEMS provides reference case load shapes for several end uses, including commercial space cooling, by Census Division. The model uses predicted growth in demand for each end use to build up a projection of the total electric system load growth for each region, which it uses in turn to predict the necessary additions to capacity. The NEMS-BT accounts for the implementation of efficiency standards by decrementing the appropriate reference case load shape. The Department determines the size of the decrement using data for the per-unit energy savings developed in the life-cycle cost (LCC) and payback period (PBP) analysis (Chapter 8) and the shipments forecast developed for the national impact analysis (Chapter 9).

Because the predicted reduction in capacity additions is very sensitive to the peak load impacts of the standard, the Department also will use the hourly load data from the building simulations (Chapter 6) to provide an independent estimate of the resulting total system load decrement for a given trial standard level.

Since the *AEO2003* version of NEMS forecasts only to the year 2025, DOE must extrapolate the results to 2035. The Department will use the approach developed by EIA to forecast fuel prices for the Federal Energy Management Program (FEMP). FEMP uses these prices to estimate life-cycle costs of federal equipment procurements. For petroleum products, EIA uses the average growth rate for the world oil price over the years 2010 to 2025, in combination with the refinery and distribution markups from the year 2025, to determine the regional price forecasts. Similarly, EIA derives natural gas prices from an average growth rate figure in combination with regional price margins from the year 2025.

13.3 RESULTS

Results of the analysis will include changes in commercial electricity sales, and installed capacity and generation by fuel type, for each trial standard level, in five-year, forecasted increments extrapolated to the year 2035.

REFERENCES

1. U.S. Department of Energy-Energy Information Administration, *Annual Energy Outlook 2003*, January 2003. Washington, D.C. Report No. DOE/EIA-0383(2003).